

IN THE CLAIMS:

Please enter the following amended claim set:

Claims 1-58: (Previously Canceled)

59. (Currently Amended) A method of subjecting a sample to rapid thermal cycling, said method comprising:

a) contacting a sample holder containing a sample with heated fluid, thereby raising the temperature of the sample to a first temperature, and holding the sample at about said first temperature for a first predetermined period of time;

b) contacting the sample holder with non-heated fluid, thereby lowering the temperature of the sample to a second temperature, and holding the sample at about said second temperature for a second predetermined period of time;

c) contacting the sample holder with heated fluid, thereby raising the temperature of the sample to a third temperature, and holding the sample at about said third temperature for a third predetermined period of time;

wherein steps a) through c) are completed within a time range of about 30 seconds to about 60 seconds and repeated at least one time; and

wherein said sample holder has a thermal mass which provides for completing said cycle ~~in about 30 to about 60 seconds~~ within said time range.

60. (Canceled)

61. (Currently Amended) The method of Claim 59 ~~or 60~~, wherein said sample holder is one of a plurality of sample holders.

62. (Currently Amended) The method of Claim 59 ~~or 60~~, wherein the first predetermined period of time is about 8 seconds or less.

63. (Previously Presented) The method of Claim 62, wherein the first predetermined period of time is less than 1 second.

64. (Currently Amended) The method of Claim 59 ~~or 60~~, wherein said lowering in step b) occurs in about 25 seconds or less.

65. (Currently Amended) The method of Claim 59 ~~or 60~~, wherein said lowering in step b) occurs at an average rate of between at least about 1.5 °C per second and up to about 4.1 °C per second.

66. (Previously Canceled)

67. (Currently Amended) The method of Claim 59 ~~or 60~~, wherein the difference between said first and said second temperature is up to about 42 °C.

68. (Currently Amended) The method of Claim 59 ~~or 60~~, wherein the second predetermined period of time is about 5 seconds or less.

69. (Previously Presented) The method of Claim 68, wherein the second predetermined period of time is less than 1 second.

70. (Previously Amended) A method of amplifying a nucleic acid, said method comprising:

a) heating a sample holder containing a sample comprising a nucleic acid and amplification primer, thereby raising the temperature of the sample to a first temperature, and holding the sample at about said first temperature for a first predetermined period of time to denature said double-stranded nucleic acid;

b) cooling the sample holder, thereby lowering the temperature of the nucleic acid sample to a second temperature, and holding the sample at about said second temperature for a second predetermined period of time to anneal said amplification primer;

c) heating the sample holder, thereby raising the temperature of the nucleic acid sample to a third temperature, and holding the sample at about said third temperature for a third predetermined period of time to allow amplification of said nucleic acid;

d) repeating steps a) through c), wherein steps a) through c) are completed within a time range of about 30 seconds to about 60 seconds;

wherein said sample holder has a thermal mass which provides for completing said cycle in about 30 to about 60 seconds within said time range.

71. (Previously Presented) The method of Claim 70, wherein said sample further comprises a nucleic acid polymerizing enzyme.

72. (Previously Presented) The method of Claim 70, wherein said sample holder is one of a plurality of sample holders.

73. (Previously Presented) The method of Claim 70, wherein the first predetermined period of time is less than 1 second.

74. (Previously Presented) The method of Claim 70, wherein said lowering in step b) occurs in about 25 seconds or less.

75. (Previously Presented) The method of Claim 74, wherein said lowering in step b) occurs in about 9 seconds.

76. (Previously Presented) The method of Claim 70, wherein said lowering in step b) occurs at an average rate of between at least about 1.5 °C per second and up to about 4.1 °C per second.

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~~78.~~ (Previously Presented) The method of Claim 70, wherein the difference between said first and said second temperature is up to about 42 °C.

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~~79.~~ (Previously Presented) The method of Claim 70, wherein the second predetermined period of time is about 5 seconds or less.

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~~80.~~ (Previously Presented) The method of Claim ~~79~~, wherein the second predetermined period of time is less than 1 second.

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~~81.~~ (Currently Amended) A method of subjecting a nucleic acid sample to rapid thermal cycling to amplify a nucleic acid, said method comprising:

a) raising the temperature of a sample comprising a nucleic acid to a first temperature and holding the sample at about said first temperature for a first predetermined period of time:

b) lowering the temperature of the sample to a second temperature at a rate at least about 1.5 °C per second and holding the sample at about said second temperature for a second predetermined period of time:

c) repeating steps a) and b) at least once in order to amplify said nucleic acid, wherein each cycle of steps is completed within a time range of about 30 seconds to 60 seconds.

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~~82.~~ (Currently Amended) The method of Claim ~~81~~, further comprising;

c) an intervening step d) between step b) and step c) wherein said step comprises raising the temperature of the sample to a third temperature intermediate to said first and second temperatures and holding the sample at about said third temperature for a third predetermined period of time wherein said steps a), b) and d) are completed within said time range.

~~82~~
~~83~~ (Canceled)

~~83~~
~~84~~ (Previously Presented) The method of Claim ~~81~~⁸⁰ or ~~82~~⁸¹, wherein said lowering in step b) is at a rate of up to about 4.1 °C per second.

~~84~~
~~85~~ (Previously Presented) The method of Claim ~~81~~⁸⁰ or ~~82~~⁸¹, wherein the difference between said first and said second temperature is up to about 42 °C.

~~85~~
~~86~~ (Previously Presented) The method of Claim ~~81~~⁸⁰ or ~~82~~⁸¹, wherein the first predetermined period of time is about 8 seconds or less.

~~86~~
~~87~~ (Previously Presented) The method of Claim ~~81~~⁸⁰ or ~~82~~⁸¹, wherein the first predetermined period of time is less than 1 second.

~~87~~
~~88~~ (Previously Presented) The method of Claim ~~81~~⁸⁰ or ~~82~~⁸¹, wherein the second predetermined period of time is about 20 seconds or less.

~~88~~
~~89~~ (Previously Presented) The method of Claim ~~81~~⁸⁰ or ~~82~~⁸¹, wherein the second predetermined period of time is less than 1 second.

~~89~~
~~90~~ (Currently Amended) The method of Claim ~~70~~⁸⁰ ~~81~~⁸¹ or ~~82~~⁸¹, further comprising the step;
e) detecting the amplification of the nucleic acid products by fluorescence.

~~90~~
~~91~~ (New) A method of subjecting a sample to rapid thermal cycling, said method comprising:

a) heating a sample holder containing a sample with heated fluid, thereby raising the temperature of the sample to a first temperature, and holding the sample at about said first temperature for a first predetermined period of time;

b) cooling the sample holder with non-heated fluid, thereby lowering the temperature of the sample to a second temperature, and holding the sample at about said second temperature for a second predetermined period of time;

c) heating the sample holder with heated fluid, thereby raising the temperature of the sample to a third temperature, and holding the sample at about said third temperature for a third predetermined period of time;

wherein steps a) through c) are completed within a time range of about 30 seconds to 60 seconds and repeated at least one time; and

wherein said sample holder has a thermal mass which provides for completing said cycle within said time range.

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~~92~~. (New) The method of Claim ⁹⁰~~91~~, wherein said sample holder is one of a plurality of sample holders.

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~~93~~. (New) The method of Claim ⁹⁰~~91~~, wherein the first predetermined period of time is less than 1 second.

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~~94~~. (New) The method of Claim ⁹⁰~~91~~, wherein said lowering in step b) occurs in about 25 seconds or less.

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~~95~~. (New) The method of Claim ⁹⁰~~91~~, wherein said lowering in step b) occurs in about 9 seconds.

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~~96~~. (New) The method of Claim ⁹⁰~~91~~, wherein said lowering in step b) occurs at an average rate of between at least about 1.5 °C per second and up to about 4.1 °C per second.

⁹⁶
~~97~~. (New) The method of Claim ⁹⁰~~91~~, wherein the difference between said first and said second temperature is up to about 42 °C.

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~~98~~. (New) The method of Claim ⁹⁰~~91~~, wherein the second predetermined period of time is about 5 seconds or less.

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~~99~~. (New) The method of Claim ⁹⁰~~91~~, wherein the second predetermined period of time is less than 1 second.

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~~100~~. (New) The method of Claim ⁹⁰~~91~~, wherein said sample comprises a nucleic acid.

¹⁰⁰
~~101~~. (New) The method of Claim ⁹⁹~~100~~, wherein said sample further comprises a nucleic acid polymerizing enzyme.